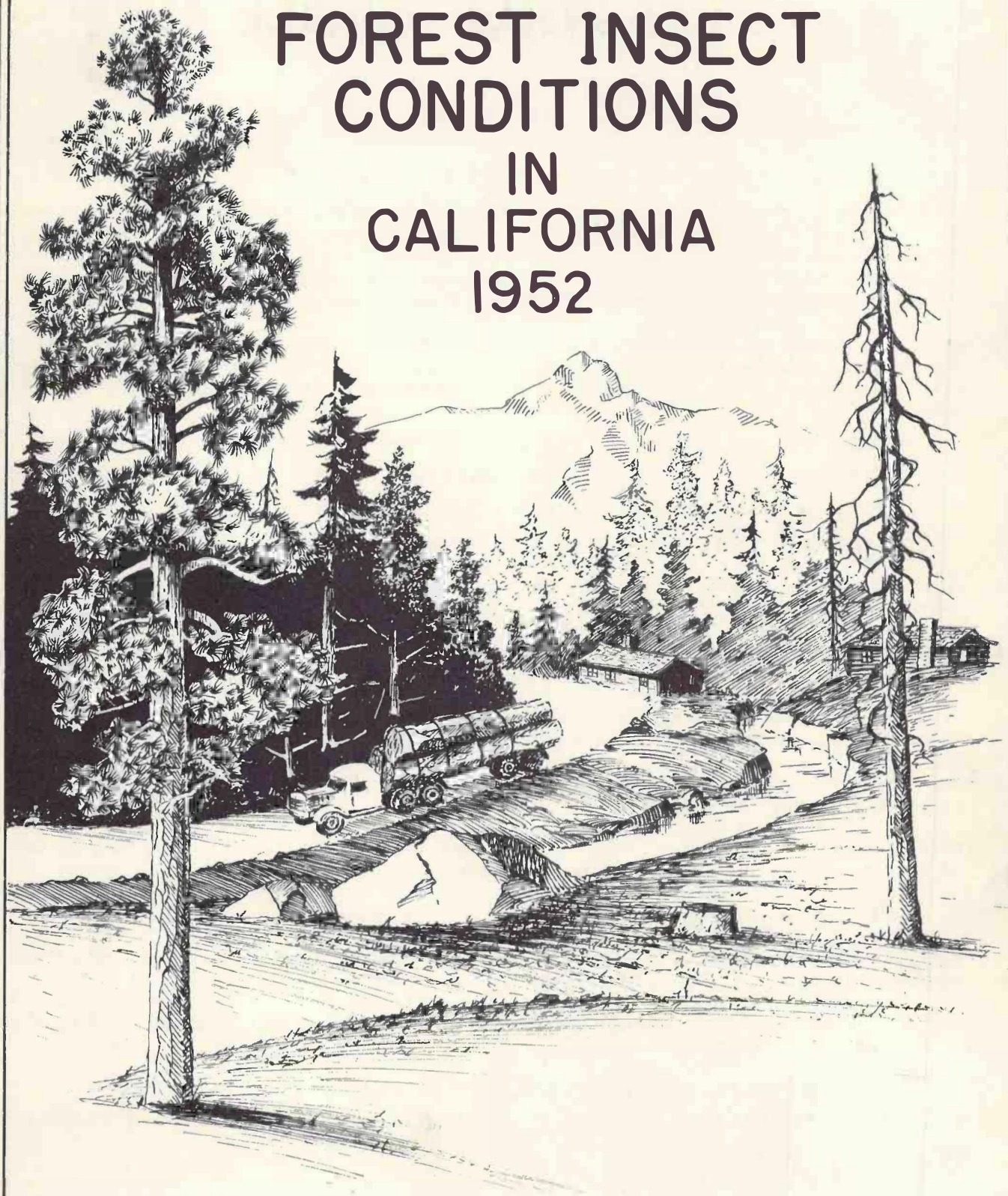
625.3
DO NOT REMOVE FROM FILES!!

FOREST INSECT CONDITIONS IN CALIFORNIA 1952



PROTECT YOUR TREES FROM INSECT DAMAGE

Western Pine Beetle

Pine Engraver Beetle

Pine bark beetles are responsible for most of the killing of pines in this area. The pine engraver beetles usually attack and kill the top portion of trees or groups of small trees. The western pine beetle usually attacks and kills the large overmature trees, but may also kill the lower portions of smaller trees previously injured by the pine engraver beetles. Observance of the following simple rules will help to prevent damage or death from bark beetles in your vicinity:

1. Do not cut green trees and leave them lying in the woods. Pole line clearings, fuel wood cutting, land clearing, and construction work may produce logs or slash suitable for bark beetle breeding. Newly fallen green trees should be treated within three days by one of the following methods:
   a. Remove them to a dump or safe place and burn them.
   b. Spray them on all sides with a 5% solution of DDT in fuel oil.
   c. Peel the bark from stems more than three inches in diameter.
   d. Cut off all limbs and scatter them away from the main stem.
2. Avoid cutting trees during spring and early summer if possible, as bark beetles are most active during this period.
3. Do not pile green pine cordwood or lumber in a pine grove or against green trees. This material will attract bark beetles to the area.
4. Do not injure trees with climbing spurs, axe cuts, girdling, guy wires, bulldozers or other means. Injured trees are highly susceptible to beetle attack.
5. Keep the cutting of tree roots to a minimum during house and road construction. Such injury increases susceptibility to insect attack.
6. Do not trample or compact the soil or lay paving around the base of trees. That deprives the roots of air and moisture and invites bark beetle attacks.
7. Do not allow fire to scorch any part of a live tree, as beetle infestation is likely to follows.
8. If you have an infested tree cut and remove or treat it as soon as possible after discovery. Dangerous insect populations can quickly multiply there.

See your nearest forest ranger for further information regarding burning, spraying or disposal of fallen trees or suspected infestations.

U. S. BUREAU OF ENTOMOLOGY & PLANT QUARANTINE
U. S. FOREST SERVICE CALIFORNIA DIVISION OF FORESTRY

Figure 1. Much pine bark-beetle damage can be prevented by following the rules outlined in this educational poster.

FOREST INSECT CONDITIONS IN CALIFORNIA

As Revealed by Detection Surveys During 1952

CALIFORNIA DIVISION OF FORESTRY
Department of Natural Resources
DeWitt Nelson, State Forester

A Report Prepared in Cooperation with the

U. S. BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
Forest Insect Laboratory
Berkeley, California
C. B. Eaton, Entomologist in Charge

Sacramento January 1953

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STATEWIDE CONDITIONS IN BRIEF

This year tree killing by forest insects has resulted in a tremendous loss of valuable timber. Losses in pine alone are estimated at approximately 300,000,000 board feet. In addition, an equal volume of fir is estimated to have been killed. Producers and consumers of wood products should recognize that this destruction has cost forest managers millions of dollars in timber, most of which will be unusable before it can be salvaged. It is the purpose of this report to summarize current forest insect conditions and outline measures needed to abate outbreaks.

The loss of pine continues to be mainly in old-growth stands. Forests of the coast region and the west slope of the Sierra Nevada mountains experienced a rather low level of loss this year. However, local areas of epidemic tree-killing occur in both areas. Elsewhere, mortality is especially serious in the nearly pure pine stands of northeastern California. Losses there are much higher than at any time since the period of great devastation over 20 years ago (see Figure 2).

Losses in stands of various fir species rose to an unusually high level this year. White and red fir suffered severely from engraver beetle attacks throughout the higher altitudes in the Sierra Nevada mountain range. Douglas-fir loss continued in parts of the northern Sierra Nevada and to a lesser degree in the north-coast range.

Highlights of forest insect conditions in California during 1952 are:

1. The western pine beetle remains the major killer of pine but attacks are somewhat fewer than in recent years. Notable exceptions to the generally lower loss trend exist in most southern California areas and in certain parts of northeastern California.

2. The Jeffrey pine beetle, usually much less destructive than the western pine beetle, became the paramount killer in wide areas of Plumas and Lassen County.

3. The mountain pine beetle is still active in second-growth sugar pine in Mariposa County and in young ponderosa pine at Crystal Bay, Lake Tahoe, Nevada.

4. The Douglas-fir beetle persists in mixed conifer stands in the northern Sierra Nevada mountains after having caused alarming losses last year.

5. The fir-engraver beetles showed no selective tendency in killing vast numbers of large and small true firs at high elevations in the Sierra Nevada mountains.

6. Pine engraver beetles are bothersome locally but have not displayed their periodic ability to muster enormous populations, although widespread snow breakage last winter provided ample breeding material.

7. Heavy defoliation of white fir by a sawfly was found in Plumas County. Similar damage had not been previously recorded in California.

8. Cone insects accompanied this year's bumper crop of pine seed. These insects are capable of destroying a complete seed crop but the extent of damage caused this year is unknown.

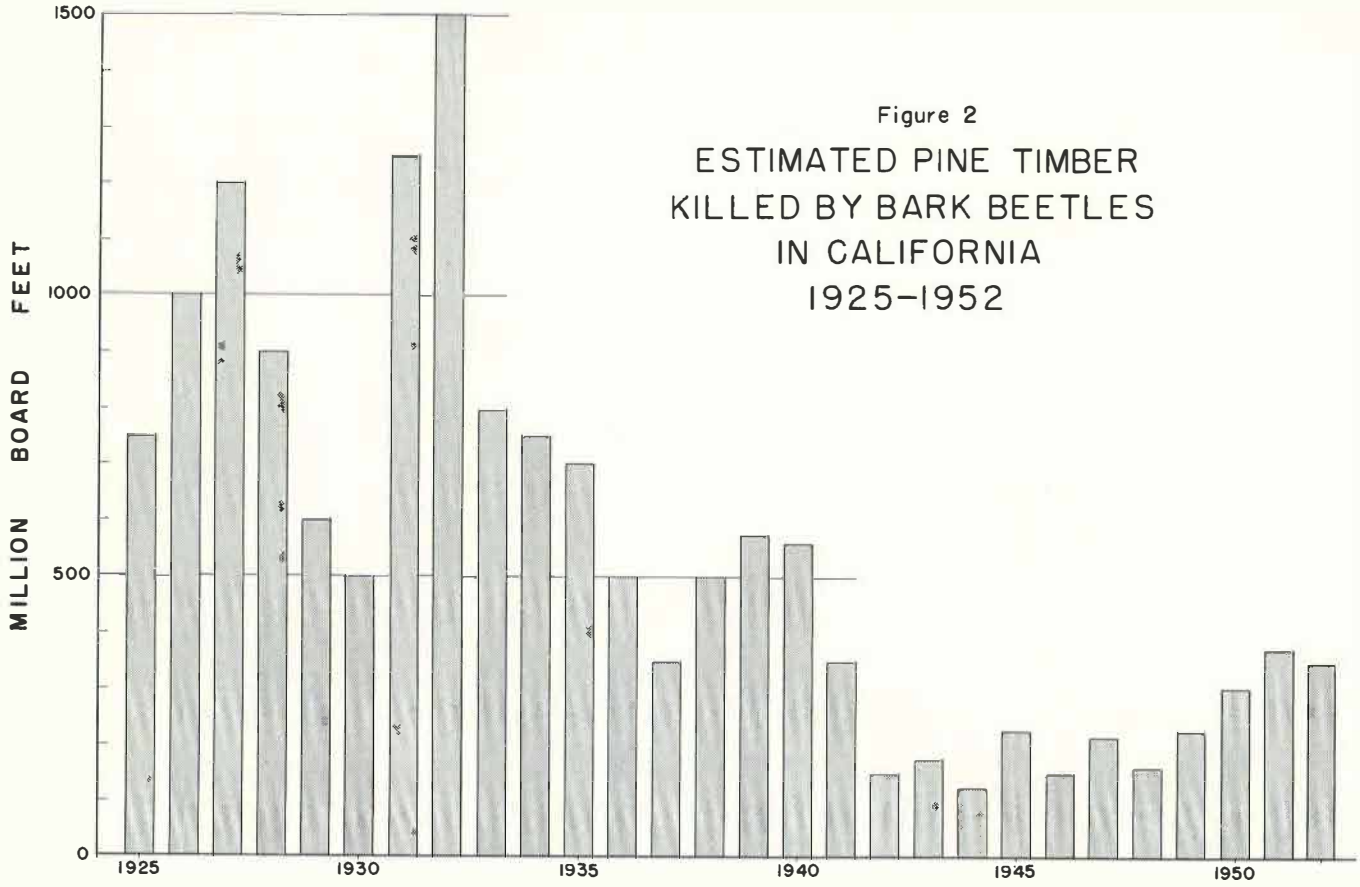

Figure 2

ESTIMATED PINE TIMBER
KILLED BY BARK BEETLES
IN CALIFORNIA
1925-1952

THE COOPERATIVE SURVEY PROGRAM

The Berkeley Forest Insect Laboratory has for years conducted annual surveys in the forested areas of California. In addition, it has functioned as a clearing house for survey information received at random from various sources other than its own. The magnitude of the job of providing adequate survey coverage has increased rapidly in recent years. Greater economic value attached to insect-killed trees and recognition of the fact that prompt detection of incipient outbreaks is essential to successful control have been factors resulting in the need for expanded surveys. The Laboratory has met this need by formulating a cooperative survey program whereby its own efforts are bolstered by information from many cooperators working for federal, state and private agencies. This cooperative program comprises a two-fold approach. The detection phase is aimed at discovering the presence of insect outbreaks at an early stage, while effective action can be taken to suppress them. The remainder of the program involves the establishment of sample plots from which the amount of insect damage can be ascertained.

DETECTION SURVEYS

Observing and reporting an insect infestation constitutes a detection survey. Any person can participate in this vital work by merely observing evidences of insect damage, while at work or on vacation, and reporting it to one of the agencies listed at the end of this report.

Efforts to obtain an adequate detection program to aid in protecting the State's forest resource were greatly amplified in 1951 through survey training schools. Those in attendance at these schools participated enthusiasticly in surveys again this year. The detected outbreaks included a sawfly and a needletier encountered for the first time.

Responses from cooperators totaled 86 written communications, a slight increase over last year. The Forest Insect Laboratory followed up all reports which indicated potentially serious conditions. Appraisal surveys were conducted in some infestations to obtain further information necessary in recommending and formulating control action. Still other infestations could not be visited on the ground. These infestations were observed from the air, however, and will be investigated on the ground as weather conditions permit.

An integral part of the cooperative detection program is an aerial survey conducted by the Forest Insect Laboratory to review late season developments, and to ensure against the possibility that an area has been overlooked. The aerial reconnaissance was conducted again this year with the help of a number of foresters who found it a valuable opportunity to examine their holdings.

ESTABLISHMENT OF TAGGED-TREE PLOTS

Tagged-tree plots are established in areas representing typical forest conditions in order to measure the type and amount of tree killing each year by forest insects. Considering that California contains some 15.2 million acres of forests susceptible to some kind of insect attack, the job of measuring insect-caused losses is a formidable one. During the year, progress was made toward strengthening this phase of the survey system by establishing 38 new plots. The Bureau of Entomology and Plant Quarantine hopes to progress much further along this line in the coming year by canvassing all forest-managing agencies for assistance. It is believed that there are many sample plots already in existence that can be incorporated into the survey of annual loss from insect attack.

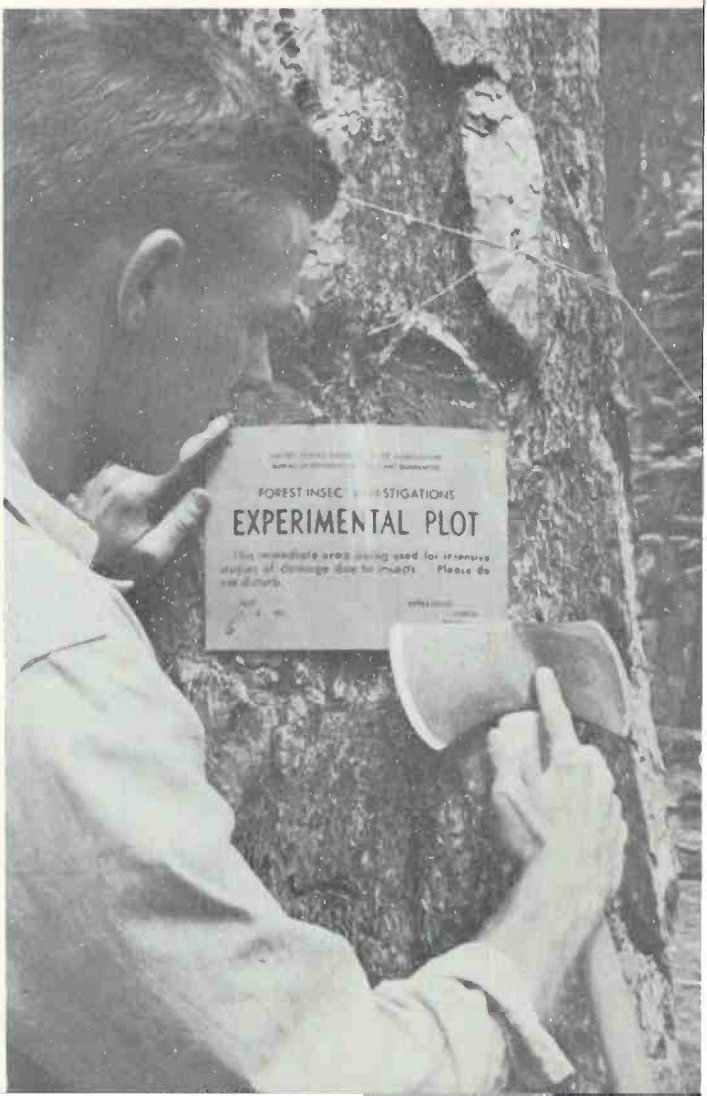

Figure 3. An important phase of the Cooperative Survey Program is the establishment of tagged-tree plots to measure tree-killing by insects.

STATUS OF THE MAJOR FOREST INSECT PESTS DURING 1952

1. Western pine beetle (Dendroctonus brevicomis). Tree killing by this beetle is at a normal level throughout most of the range of its host, ponderosa pine. Notable exceptions prevail in southern California forested recreational areas and in old growth stands in northeastern California.

2. Jeffrey pine beetle (Dendroctonus jeffreyi). Usually a pest causing scattered loss, this beetle assumed a very new role this year in several stands of Jeffrey pine. Heavy outbreaks occur in Lassen Volcanic National Park and Plumas County where epidemic group killing is now common. Surveys indicate that 3.7 million board feet of Jeffrey pine is infested in one epidemic covering 20,000 acres. The area involved is the only extensive virgin pine stand in eastern Plumas County.

3. The mountain pine beetle (Dendroctonus monticolae). Several young stands are currently infested by this beetle. Losses remain high in second-growth ponderosa pine at Crystal Bay, Lake Tahoe, Nevada but an outbreak in the Miami Creek drainage of the Sierra National Forest has diminished following control work performed last spring. The beetle is causing only light loss in most old-growth pine stands.

4. Douglas-fir beetle (Dendroctonus pseudotsugae). This beetle continues to cause concern in Shasta County where a spectacular expansion of its destructiveness was observed last year. Suppressive measures were effective but need to be extended to include less accessible areas which have not received treatment. Indications are that conditions favor large beetle populations and further trouble may be in store next year.

5. Fir engraver beetle (Scolytus ventralis). Killing of true fir species in the Sierra Nevada Mountains and in southern California attained very serious proportions this year. Only a small amount of salvage was possible due to the occurrence of loss in inaccessible locations. The magnitude of the loss greatly exceeds the destruction by this beetle during any single year in the last two decades.

6. Pine engraver beetles (Ips spp.). Attacks by these beetles in the tops of pines are often followed by other kinds of beetles in the lower bole. Although logging slash and snowbreak is suitable breeding material, large populations did not materialize following heavy snow damage last year.

7. Red turpentine beetle (Dendroctonus valens). In most instances, this beetle does not kill trees but invariably its attack is followed by other bark beetles which thoroughly girdle the trunk resulting in the death of the tree. Damage is currently very severe in several campground areas in Lassen Volcanic National Park.

8. Reproduction weevil (Cylindrocopturus eatoni). Killing by this weevil in two northern California pine plantations appears to have returned to normal following aerial spray control conducted last spring.

9. California flathead borer (Melanophila californica). The larvae of this woodborer are found in many healthy appearing pine trees where their development is extremely slow until the living processes of the host tree are subjected to severe strain as during extended droughts. Larval activity tends to weaken and predispose their host to attack by faster working bark beetles. However, in some years outright killing is accomplished by the "flatheads". Instances of such killing are quite widespread in several localities in southern California.

10. Spruce budworm (Choristoneura fumiferana). This insect has gained such notoriety in other western states recently that surveys are constantly on the alert for its presence in California. Budworm-caused defoliation was observed this year in white fir and lodgepole pine stands in the North Warner Mountains in Modoc County. An infestation has persisted there for many years but damage has been too slight to justify control action.

11. Sawflies (Neodiprion spp.). Sawflies have occasionally been observed defoliating various conifers within the State. However, damage caused by them has never before been serious. This year, reports of sawfly infestations were unusually numerous. In one area of Plumas County these insects caused severe defoliation of dense second-growth white fir during the summer. Their habit of feeding upon needles of all ages makes it probable that many trees will die. The lack of a known method of controlling these insects will be met by experimental work.

12. Lodgepole pine needle miner (Recurvaria milleri). Past outbreaks of the lodgepole needle miner have occurred mainly at high altitudes in Yosemite National Park. The great lodgepole "ghost forests" of Tenaya Basin resulted in large part from defoliation caused by needle-miner feeding. A current outbreak dates back to 1947. The two-year life cycle of the insect results in heaviest defoliation being evident in odd years. Damage during 1953 is expected to be heavy.

13. Cone beetles (Conopthorus spp.). A considerable portion of the seed accompanying this year's bumper pine cone crop was destroyed by the larvae of these beetles. Destruction of seed by their feeding contributes toward failure of pine to regenerate cut-over areas.

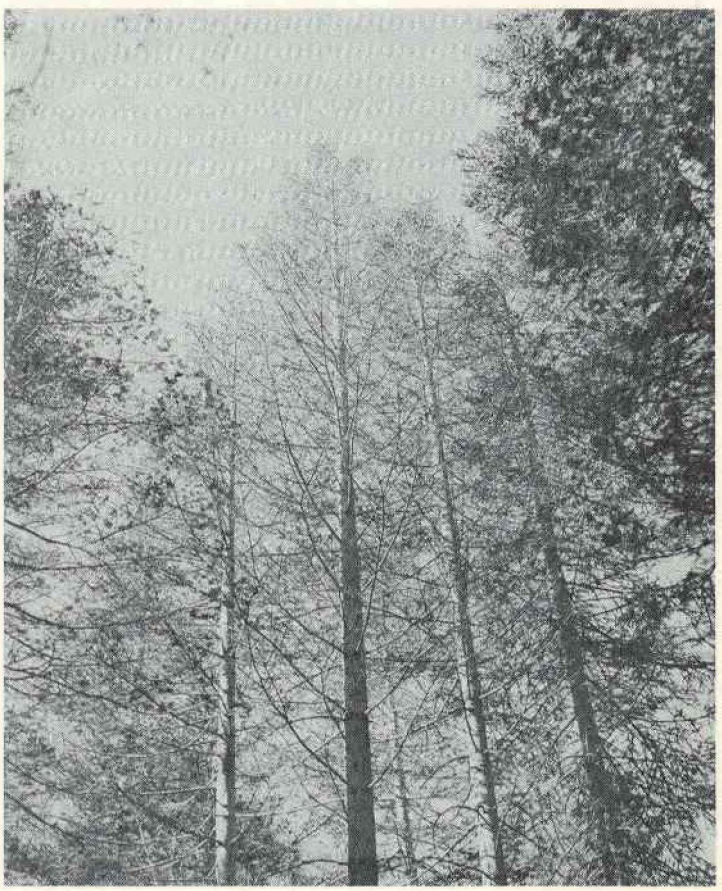

Figure 4.
White fir defoliated by a sawfly in Plumas County.

THE CONTROL ACTION PROGRAM ENDORSED FOR 1953

Based on survey findings, the details concerning 56 infestations were presented to the California Forest Pest Action Council on November 5, 1952 in Sacramento. The Council is composed of interested individuals from many forest industries and agencies and acts as an official advisor to the State Board of Forestry on forest pest matters. The control action program which is summarized on page 11 was endorsed by the Council. A minimum of 23 control projects are needed to suppress all centers of epidemic loss.

Commercial Timberlands

Bark-beetles. In the past, control of outbreaks in commercial timber has been extremely difficult. Vast stretches of nearly pure stands and the absence of topographic features to provide control units of workable size have been obstacles to operations. However, experience with the problem has resulted in better preventative forest practices, and more flexible salvage equipment has been developed and constantly improved. Because of these developments, and the increased value of wood products, we are finding ourselves in a better position to do something about the terrific waste going on in great sections of our forest resource.

The destruction of insects by direct means such as fire or insecticides has been the only weapon in the past in many situations where it is now economical to remove infested trees by logging. Aside from its value as a means of protecting a great wealth of forest resource from depredation by insects, salvage logging often provides a sizeable cash return to the forest owner and obviates the necessity of heavy expenditures from direct control. However, it is apparent that some form of direct control will continue to have a place in the control program, especially in inaccessible areas and in stands which are unmerchantable.

Defoliators. The California region has experienced relatively few serious outbreaks of defoliating insects. Those that have occurred appear to have passed quite rapidly and were rather restricted in extent. The absence of serious outbreaks by defoliators resulted in concentrating research on more pressing problems. However, tests of methods for dealing with these insects should be undertaken soon, if measures are to be available for curbing catastrophic outbreaks that may occur in the future. Some precedent for control through the use of insecticides exists in other regions where aerial spraying has been conducted at various times against defoliating insects related to those in California. Small-scale tests along similar lines will be undertaken this year with the white fir sawfly as soon as knowledge on the biology of the insect permits.

Experimental Areas

Pine reproduction weevil. The control work undertaken against the reproduction weevil in the Shasta and Burney Springs pine plantations appears to have netted satisfactory results. At this time there seems to be no need for further treatment next summer. However, a final decision will be possible only after a ground examination of these plantations in the spring when foliage will have faded on any trees which have become attacked following control operations.

Bark-beetles. Experiments with many pines at the Institute of Forest Genetics in Placerville depend upon the continued existence of all trees in a normal state of health. The injury or death of any of the trees could completely disrupt a long-term study requiring many years to repeat. Because a number of bark-beetle enemies of many of these trees occur in the immediate vicinity of the Institute, it is necessary to conduct suppressive control measures annually in the surrounding timber. The continuance of such a program will maintain insect populations at a low level and minimize the chance for attacks in the experimental trees.

National Parks

Bark-beetles. It is difficult to estimate the tremendous value of our National Parks to vacationists. Unquestionably, the time will come when they will be the only places where great trees remain to be viewed in their native condition. With these thoughts in mind, a program of annual, or maintenance, control has been established in the National Parks. This work keeps damage and loss at a minimum by maintaining insect populations at the lowest possible level. Thus, even in years of relatively light loss such as at present, some control is necessary.

It is worthy of note that, recently, logging of infested trees was instituted as a bark-beetle control method. The removal of the dead insect-laden trees, is done in winter and does not interfere with normal use of the Park. Where the trees are accessible, this method pays its way and solves the problem of disposing of the down timber which in the past has far exceeded that needed for camp wood.

Defoliators. Defoliation by the lodgepole needle miner causes concern in the rugged high country of Yosemite National Park. As indicated previously, defoliator problems have been few in the recent past and little is known about their control. However, the biology of the lodgepole needle miner is well understood and this provides a good start toward eventual development of effective control measures.

During initial work with aerial sprays in 1949, serious trouble was encountered from the standpoint of difficult terrain and high altitude. Although these factors will always hamper operations, a considerably larger experimental attempt at aerial spray control of this insect may be forthcoming this year.

Forest Recreation Areas

Bark-beetles. The insect problems prevalent in forest recreation areas are much the same as those encountered in the National Parks. Great scenic beauty and heavy use by recreationists are common to both. However, many non-Park areas are unique in that insect damage may be increased unintentionally by people themselves. Often, slash from nearby logging or land clearance has aggravated the problem by providing breeding material for bark-beetles. Because of this, educational posters like the one inside the front cover have been printed and circulated. Even with cooperation from all concerned, insects continue to kill many highly prized trees in forest recreation areas, and control is necessary to minimize these losses. The task of bark-beetle control, in some areas, has been simplified by the use of logging to remove infested trees and trees of high risk to insect attack.

Figure 5.

Mobile loader removing bark-beetle infested logs from the forest.

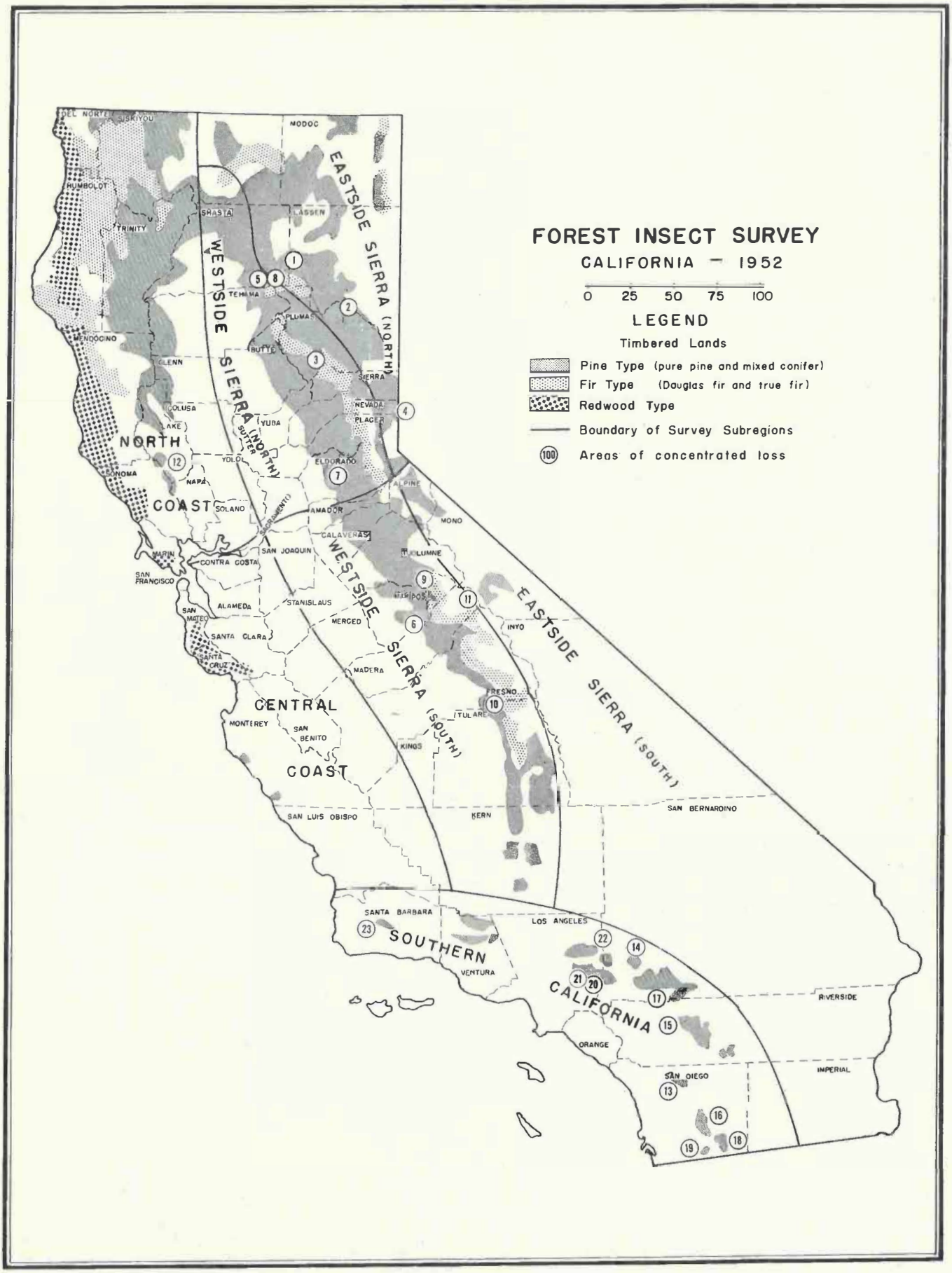
FOREST INSECT SURVEY
CALIFORNIA — 1952
0 25 50 75 100
LEGEND
Timbered Lands
Pine Type (pure pine and mixed conifer)
Fir Type (Douglas fir and true fir)
Redwood Type
Boundary of Survey Subregions
(100) Areas of concentrated loss
DEL NORTE
SISKIYOU
MODOC
HUMBOLDT
TRINITY
SHASTA
LASSEN
EASTSIDE SIERRA (NORTH)
WESTSIDE SIERRA (NORTH)
TEHAMA
PLUMAS
MENDOCINO
BUTTE
GLENN
SIERRA
COLUSA
NEVADA
PLACER
YUBA
SUTTER
LAKE
NORTH
COAST
YOLO
ELDORADO
SONOMA
NAPA
SOLANO
SACRAMENTO
AMADOR
ALPINE
MONO
CALAVERAS
MARIN
CONTRA COSTA
SAN JOAQUIN
TUOLUMNE
SAN FRANCISCO
STANISLAUS
TUOLUMNE
WESTSIDE SIERRA (SOUTH)
EASTSIDE SIERRA (SOUTH)
ALAMEDA
SAN MATEO
MERCED
INYO
SANTA CLARA
SANTA CRUZ
MADERA
FRESNO
CENTRAL
TULARE
MONTEREY
SAN BENITO
KINGS
COAST
SAN LUIS OBISPO
KERN
SAN BERNARDINO
SANTA BARBARA
LOS ANGELES
SOUTHERN
VENTURA
CALIFORNIA
RIVERSIDE
ORANGE
IMPERIAL
SAN DIEGO

TABLE 1.--CURRENT FOREST INSECT INFESTATIONS REQUIRING CONTROL ACTION

PROJECT AREA	LOCATION	INFESTED ACREAGE	INSECT SPECIES CAUSING LOSS	HOST TREE KILLED	CONTROL ACTION RECOMMENDED
			COMMERCIAL TIMBERLANDS		
(1) Lassen National Forest (Eastside area)	Lassen and Shasta Cos.	50,000	Western pine beetle Jeffrey pine beetle	Ponderosa pine Jeffrey pine	Salvage infested trees
(2) Thompson Peak	Plumas Co.	20,000	Jeffrey pine beetle	Jeffrey pine	Salvage infested trees
(3) Table Rock	Plumas Co.	2,000	Fir sawfly	White fir	Experimental spraying
(4) Crystal Bay	Lake Tahoe	1,000	Mountain pine beetle	Ponderosa pine	Salvage infested trees, spray with toxic oil
(5) Walker Forest	Shasta Co.	2,000	Douglas fir beetle	Douglas fir	Salvage infested trees
(6) Miami Creek	Mariposa and Madera Cos.	1,500	Mountain pine beetle	Sugar pine	Spray with toxic oil
			EXPERIMENTAL AREAS		
(7) Institute of Forest Genetics	Eldorado Co.	500	Western pine beetle Pine engraver beetle	Ponderosa pine	Maintenance control, fell-peel-burn
			NATIONAL PARKS		
(8) Lassen Volcanic	Shasta, Lassen, Plumas Cos.	5,000	Western pine beetle Jeffrey pine beetle Red turpentine beetle	Ponderosa pine Jeffrey pine Ponderosa pine	Maintenance control, salvage infested trees, fell-peel-burn Experimental spraying
(9) Yosemite	Mariposa, Tuolumne Cos.	10,000	Western pine beetle Mountain pine beetle	Ponderosa pine Sugar pine	Maintenance control, salvage infested trees, fell-peel-burn
		46,000	Needle miner	Lodgepole pine	Experimental spraying
(10) Sequoia-Kings Canyon	Fresno, Tulare Cos.	8,500	Western pine beetle Mountain pine beetle	Ponderosa pine Sugar pine	Maintenance control, salvage infested trees, fell-peel-burn
			FOREST RECREATION AREAS		
(11) Reds Meadow	Inyo N.F.	700	Mountain pine beetle	Lodgepole pine	Spray with toxic oil
(12) Cobb Mtn.	Lake Co.	1,000	Western pine beetle Pine engraver beetle	Ponderosa pine	Fell-peel-burn
(13) Palomar	San Diego Co.	6,000	Fir engraver beetle	White fir	Experimental control
(14) Arrowhead-Crestline	San Bernardino Co.	38,000	Western pine beetle Pine engraver beetle Jeffrey pine beetle	Ponderosa pine Coulter pine Jeffrey pine	Maintenance control, fell-peel-burn or toxic spray, salvage if possible
(15) Idyllwild-San Jacinto	Riverside Co.	14,500	Western pine beetle Pine engraver beetle	Ponderosa pine Coulter pine	Maintenance control, fell-peel-burn or toxic spray
(16) Julian-Cuyamaca	San Diego Co.	25,000	Western pine beetle Pine engraver beetle	Ponderosa pine Coulter pine	Maintenance control, fell-peel-burn or toxic spray
(17) Barton Flat	San Bernardino Co.	15,000	Western pine beetle Jeffrey pine beetle	Ponderosa pine Jeffrey pine	Sanitation salvage, fell-peel-burn
(18) Laguna Mtn.	San Diego Co.	8,000	Western pine beetle Flathead borer	Coulter pine Jeffrey pine	Maintenance control, fell-peel-burn or toxic spray
(19) Corte Madera	San Diego Co.	1,800	Western pine beetle Pine engraver beetle	Coulter pine	Maintenance control, fell-peel-burn or toxic spray
(20) Crystal Lake	Los Angeles Co.	1,000	Western pine beetle Pine engraver beetle	Ponderosa pine	Maintenance control, fell-peel-burn or toxic spray
(21) Charlton Flats	Los Angeles Co.	3,000	Western pine beetle Pine engraver beetle	Ponderosa pine Coulter pine	Maintenance control, fell-peel-burn or toxic spray
(22) Big Pines	Los Angeles Co.	8,000	Mountain pine beetle	Sugar pine	Maintenance control, fell-peel-burn or toxic spray
(23) Figueroa Mtn.	Santa Barbara Co.	1,200	Western pine beetle	Ponderosa pine Coulter pine	Maintenance control, fell-peel-burn or toxic spray

ACCOMPLISHMENTS OF RECENT CONTROL ACTION

Of the 21 infestations listed in the report of insect conditions in 1951, only the Reds Meadow Project (Madera County) did not receive control work. Heavy snows delayed access to Reds Meadow until after the over-wintering beetles had left the trees.

In addition, extensive areas of commercial timberland received treatment, mostly in conjunction with logging operations on privately-owned land. Table 2 summarizes this activity as reported to the Forest Insect Laboratory by the companies involved. Because separate records were not always maintained, the table includes the volume of abandoned insect-killed trees removed by logging in addition to insect-infested trees.

The California State Division of Forestry, National Park Service, and U. S. Forest Service were especially active in the field of forest insect control work this year. The accomplishments of these agencies are summarized in Tables 3 and 4.

TABLE 2.--VOLUME OF INSECT-KILLED OR SUSCEPTIBLE TREES REMOVED BY LOGGING FROM PRIVATELY-OWNED TIMBERLAND DURING 1952.

	Company	Volume (thousand bd. ft.)	Remarks
1.	Collins Almanor Forest	2,000	Salvage of pine
2.	Fruit Grower's Supply Company	1,014	Insect-killed and windthrown pine
3.	Glen Company Forest Products Corp.	25	Insect-infested pine
4.	McCloud River Lumber Company	2,041	Sanitation-salvage logging pine
5.	Scott Lumber Company	892	High-risk pine; windthrown pine and fir
6.	U. S. Plywood Corporation	200	Salvage of pine
7.	Weyerhaeuser Timber Company	4,000	Sanitation-salvage logging pine
8.	Walker Forest	500	Insect-infested Douglas fir
		10,672	

TABLE 3.--INSECT CONTROL PROJECTS ACCOMPLISHED ON STATE AND PRIVATE LAND IN 1952 UNDER THE STATE FOREST INSECT CONTROL LAW IN COOPERATION WITH PRIVATE TIMBERLAND OWNERS.

	Location	Number of Trees	Insect	Host	Remarks
1.	Lake County	338	Western pine beetle	Ponderosa pine	Peel-burn
2.	Mariposa, Madera Co.	871	Mountain pine beetle	Sugar pine	Toxic oil spray
		204*	Mountain pine beetle	Sugar pine	Toxic oil spray
3.	Lake Arrowhead	625*	Western pine beetle Mountain pine beetle Pine engraver beetle	Ponderosa pine Sugar pine Jeffrey pine Coulter pine	Peel-burn and toxic oil spray
		2,100*	Pine engraver beetle	Snowbreakage	Toxic oil spray
4.	San Jacinto	50*	Western pine beetle Mountain pine beetle	Ponderosa pine Jeffrey pine Sugar pine	Peel-burn
		4,188			

* Work contracted to U. S. Forest Service

TABLE 4.--INSECT CONTROL PERFORMED BY FEDERAL AGENCIES DURING 1952.

	Location	No. of trees	Insect	Host	Method of control
			NATIONAL PARKS		
1.	Lassen Volcanic	73	Barkbeetles	Pine	Peel-burn
2.	Yosemite	367	Barkbeetles	Pine	Peel-burn
3.	Sequoia-Kings Canyon	107	Barkbeetles	Pine	Peel-burn
			NATIONAL FORESTS		
1.	Angeles	310	Barkbeetles	Pine	Toxic oil spray
2.	Cleveland	263	Barkbeetles	Pine	Peel-burn, toxic oil spray
3.	Los Padres	104	Barkbeetles	Pine	Toxic oil spray
4.	San Bernardino	14,229	Barkbeetles	Pine	Toxic oil spray
5.	Sierra	1,179	Barkbeetles	Pine	Toxic oil spray
6.	Lassen	500	Reproduction weevil	Pine	Aerial spraying
7.	Shasta	2,000	Reproduction weevil	Pine	Aerial spraying
		19,132			

Figure 6. Applying toxic oil with a stirrup pump to destroy the mountain pine beetle in second growth sugar pine.

FOREST INSECT OUTBREAKS IN OTHER WESTERN STATES

It appears that never before has there been recorded such devastating epidemics through the forests of our western states. Rough estimates place the loss of the last ten years at about 30 billion board feet. Had this been accessible to them all the mills in the west could have been kept running for a year and a half on insect-killed timber alone. The more outstanding outbreaks are:

Engelmann spruce beetle - Twelve billion board feet of spruce are threatened in northern Montana where this beetle attacked and killed 600 million board feet of timber during 1952. Hope of adequate salvage is dimmed by the inadequate output capacity of the mills in the northern Rocky Mountain region. A similar epidemic appears to be subsiding in Colorado where 3.8 billion board feet of spruce was killed during the period 1941-1951.

Spruce budworm - Defoliation caused by this insect is extremely prevalent throughout the west. Epidemics exist in the Rocky Mountains, Pacific Northwest and Western Canada. Control by aerial spraying DDT has been conducted over 2,793,000 acres of Douglas fir in Oregon during the period 1949-1952.

Douglas-fir beetle - Killing is now heavy throughout the range of Douglas fir. Seemingly as a consequence of very widespread windthrow in Oregon and Washington last December, there is now one billion board feet of beetle-infested Douglas fir in those states. The estimated loss in Douglas fir in western states during the past ten years is 10 billion board feet.

Additional information concerning forest insects may be obtained by request to the State Forester or the Bureau of Entomology and Plant Quarantine, Forest Insect Laboratory, 29 Forestry Building, University of California, Berkeley 4, California

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